Patent Claims

1. Process for the production of a membrane module, comprising a number of rod-shaped, ceramic filter elements (1.1, 1.2, 1.3), which are arranged parallel to one another and are clamped at the rod ends by covers (3), which in turn run perpendicular to rods (1.1, 1.2, 1.3), and also seals (3.1), which are provided between the ends of the rods, as well as openings in covers (3), which is characterized by the following features:

1.1. First, the individual seal (3.1) is produced in part by making its inner openings to the finished size, which is specified for enclosing the end of the rod, while the outer surface of seal (3.1) remains unprocessed, so that a blank seal is formed;

1.2 then the blank seal is attached onto a holder, which has outer dimensions in the attachment region that correspond to the average outer dimension of all filter elements or a plurality of filter elements (1.1, 1.2, 1.3);

1.3 then the blank seal attached to the holder is processed on its outer surface, so that it attains a nominal size and thus becomes the finished seal (3.1);

1.4 then the finished seal is attached onto the terminal region of a filter element (1.1, 1.2, 1.3, 1.4) and--together with the other elements--is assembled into a finished membrane module.

2. Process according to claim 1, further characterized in that the terminal regions of each filter element (1.1, 1.2, 1.3) are under-dimensioned relative to the main region.

3. Process according to one of claims 1 or 2, further characterized in that the terminal regions of filter elements (1.1, 1.2, 1.3) are reinforced at least on their lateral surfaces, and optionally on their front surfaces, so that there is no contact between the medium to be filtered and the material of the seal during operation of the membrane module.

4. Membrane module

4.1 with a number of rod-shaped ceramic filter elements (rods 1.1, 1.2, 1.3);

4.2 the rods are arranged parallel to one another and clamped on their ends by covers (3), which in turn run perpendicular to the rods (1.1, 1.2, 1.3), and are the components of a housing (2), which encloses rods (1.1, 1.2, 1.3);

4.3 seals (3.1) are provided between the ends of the rods and the openings in covers (3);

produced according to one of the methods of claims 1 to 3.

5. Membrane module, particularly according to claim 4

5.1 with a number of rod-shaped ceramic filter elements (rods 1.1, 1.2, 1.3);

5.2 rods (1.1, 1.2, 1.3) are arranged parallel to one another, and are clamped on their ends by covers (3) which run perpendicularly to rods (1.1, 1.2, 1.3) and are components of a housing (2), which encloses rods (1.1, 1.2, 1.3);

5.3 seals (3.1) are provided between the ends of the rods and openings in covers (3);

5.4 the terminal regions of rods (1.1, 1.2, 1.3) are the same size as the main parts of the rods or are under-dimensioned relative to the main part.

6. Membrane module, particularly according to claim 4 or 5

6.1 with a number of rod-shaped ceramic filter elements (rods 1.1, 1.2, 1.3);

6.2 the rods (1.1, 1.2, 1.3) are arranged parallel to one another, and are clamped on their ends by covers which in turn run perpendicular to rods (1.1, 1.2, 1.3) and are the components of a housing (2), which surrounds rods (1.1, 1.2, 1.3);

6.3 seals (3.1) are provided between the ends of the rods and openings in covers (3);

6.4 the terminal regions of rods (1.1, 1.2, 1.3) are reinforced at least on their periphery and also optionally on their front side, so that the medium to be filtered cannot come into contact with the material of seal (3.1).

7. Membrane module according to one of claims 4 to 6, further characterized in that the permeate outlet connection is arranged on the housing such that the inside space of the housing is completely emptied of permeate when the module is not in operation.

8. Membrane module according to one of claims 4 to 7, further characterized by the following features:

8.1 each cover (3) comprises an outer plate (3.2), an inner plate (3.3), as well as a seal (3.1), enclosed between these plates, like a sandwich;

8.2 a free space remains between the outer plate (3.2) and the inner plate (3.3), radially outside the seal (3.1);

8.3 seal (3.1) is reinforced on its periphery such that its extension out into the free space when the outer plate (3.2) and the inner plate (3.3) are clamped together is hindered or completely eliminated.

9. Membrane module according to claim 8, further characterized in that a collar surrounds the seal (3.1) in the region of the free space or is embedded in seal (3.1).